



The U.S. Army Combat Capabilities Development Command (DEVCOM) leads in the discovery, development and delivery of technology-based capabilities to enable Soldiers to win our nation's wars and come home safely. DEVCOM is a major subordinate command of the U.S. Army Futures Command. The DEVCOM Chemical Biological Center is the Army's principal research and development center for chemical and biological defense technology, engineering and field operations. The DEVCOM Chemical Biological Center is headquartered at Aberdeen Proving Ground, Maryland.

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Smaller, Faster Prototype Detects Chemicals in Fingerprints

By Jerilyn Coleman



A fingerprint is placed on a CD and positioned under the PCFIS to demonstrate its ability to detect chemical residue left behind on the object.

Aberdeen Proving Ground, MD – Researchers at the U.S. Army's Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) have helped improve technology that could give our Soldiers a forensic advantage by detecting minuscule traces of chemicals left behind by adversaries in the field.

The new technology prototype is called the Portable Chemical Fingerprint Identification System (PCFIS). The Center's Spectroscopy Branch developed the system in partnership with Pendar Technologies, a technology startup company located in Cambridge, Massachusetts. The PCFIS is a small,

automated device that can detect chemicals with very low concentration -- even substances pulled from a fingerprint.

<p>L-RCIM</p> <ul style="list-style-type: none"> • 150 lbs. • Research grade • Doctoral level expertise • Non-automated 	
<p>CFIS</p> <ul style="list-style-type: none"> • 80 lbs. • Non-portable • Automated • Minimum training required 	
<p>PCFIS</p> <ul style="list-style-type: none"> • 10 lbs. • portable • Automated • Minimum training required 	

The latest prototype weighs approximately 10 pounds, compared to earlier versions of the system that weighed more than 75 pounds.

As Center researchers worked with Pendar in developing the device, one of the goals was scaling it down. The latest prototype weighs approximately 10 pounds, compared to earlier versions of the system that weighed more than 75 pounds. The Center has also improved the device's ability to quickly determine chemical substances, ranging from explosives to narcotics.

"Let's say somebody was building a bomb that left energetic particles on their fingers, and they're being questioned later by U.S. warfighters," said Dr. Ashish Tripathi, Center research scientist and technical lead for the PCFIS prototype. "Warfighters can ask them to deposit their fingerprint on a substrate. Within three minutes, the substrate will state if their fingerprint contained those explosive particles."



Since it is lightweight and works quickly, the PCFIS is a valuable screening tool, enabling warfighters to make critical decisions in the field. The system can confirm screening results in a mobile laboratory, at entry control points, in standard forensic laboratories, and during sensitive site exploitation. The PCFIS can also be a valuable tool for law enforcement agencies investigating possible home explosives or narcotics laboratories.



Dr. Jason Guicheteau (left) and Dr. Ashish Tripathi (right) are working on getting the PCFIS transitioned to the warfighter.

The project team overcame the challenges of COVID-19 restrictions to demonstrate the capabilities of the PCFIS to additional potential industry partners. The Spectroscopy Branch teamed up with the Center's Technology Transfer Office to find a virtual solution, and in March they hosted a virtual demonstration over Microsoft Teams. Dr. Jason Guicheteau, Center research chemist and principal investigator leading the PCFIS effort, led the virtual demonstration of the device. Afterward, Amanda Hess and the Technology Transfer staff discussed strategies with attendees regarding the transition of this technology

and potential engagement with government partners. Technology Transfer specialist, Andrea Bechtel-Mathias said, "our idea was to take advantage of the MS Teams virtual platform." "We wanted to create a place where potential partners could tune in and hear our researchers explain the project, see the device at work, and then start a conversation," she added.

Currently, Guicheteau and the team are working on getting the PCFIS transitioned to the warfighter and are seeking other government partners who can help develop, improve and transition the device. "We aim to partner with agencies who can transition this into the hands of warfighters," said Guicheteau. "We want to continue to harden the device, address users' needs, and streamline the software to make it easy for anyone to understand and use."

The key to transitioning the PCFIS is to get input from warfighters. Center scientists want to put the device into Soldiers' hands and learn more about how they would ideally like this technology to work in the field. "The PCFIS device will be part of various Soldier demonstrations over the next year," said Tripathi. "We have invited those Soldiers taking part in the demonstrations to tell us what they would like changed on this device, so the next version will match what they need."

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